ORDER NO. HAD8506144C2

Service Manual

Tuner

QUARTZ Synthesizer
FM/AM Stereo Tuner

ST-G4

Color

(K)...Black Type
(S)...Silver Type

Color	Area
(K) (S)	[EGB].... F.R. Germany.

TECHNISCHE DATEN

(DIN 45 500)

■ UKW-TUNERTEIL

Wellenbereich	87,50 ~ 108,00 MHz
	87,525 ~ 108,00 MHz (+25 kHz shift)
Eingangsempfindlichkeit	1,5 μV (nutzbar nach IHF)
S/R 30 dB	1,3 μV (75 Ω)
S/R 26 dB	1,2 μV (75 Ω)
S/R 20 dB	0,9 μV (75 Ω)
Stereoumschaltschwelle bei 46 dB nach IHF	28 μV/75 Ω
Gesamtklirrfaktor	
Mono (normal)	0,02%
Stereo (normal)	0,03%
Geräuschabstand	
Mono	72 dB (80 dB nach IHF)
Stereo	68 dB (73 dB nach IHF)
Frequenzgang	4 Hz ~ 15 kHz (+0,5 dB ~ −1,5 dB)
Trennschärfe bei Störsender	
normal ±400 kHz	50 dB
super narrow ±200 kHz	25 dB
Einfangverhältnis	1,0 dB
Spiegelfrequenz-Dämpfung bei 98 MHz	100 dB
ZF-Dämpfung bei 98 MHz	100 dB
Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz	110 dB
MW-Unterdrückung	55 dB
Übersprechdämpfung	
1 kHz	55 dB
10 kHz	40 dB
Trägerrest	
19 kHz	−75 dB (−80 dB nach IHF)
38 kHz	−75 dB (−80 dB nach IHF)
Kanalabweichung (250 Hz ~ 6300 Hz)	±1,0 dB
Begrenzereinsatz	0,85 μV
Bandbreite	
ZF-Verstärker	180 kHz
UKW-Demodulator	1,000 kHz
Antennenanschluß	75 Ω (unsymmetrisch)

■ MW-TUNERTEIL

Wellenbereiche	522 ~ 1611 kHz (9-kHz-Schritte)
	530 ~ 1610 kHz (10-kHz-Schritte)
Eingangsempfindlichkeit (S/R 20 dB)	20 μV, 300 μV/m
Trennschärfe (±9 kHz)	55 dB
Spiegelfrequenz-Dämpfung bei 999 kHz	40 dB
ZF-Dämpfung bei 999 kHz	60 dB

■ ALLGEMEINE DATEN

Ausgangsspannung	0,45 V (0,9 V IHF)
Leistungsaufnahme	9W
Netzspannung	Wechselstrom 50 Hz/60 Hz, 220V
Abmessungen (B×H×T)	430 × 64 × 241 mm
Gewicht	2,2 kg

Bemerkung:
Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.

(Die technischen Daten können infolge von Verbesserungen ohne Ankündigung geändert werden.)

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

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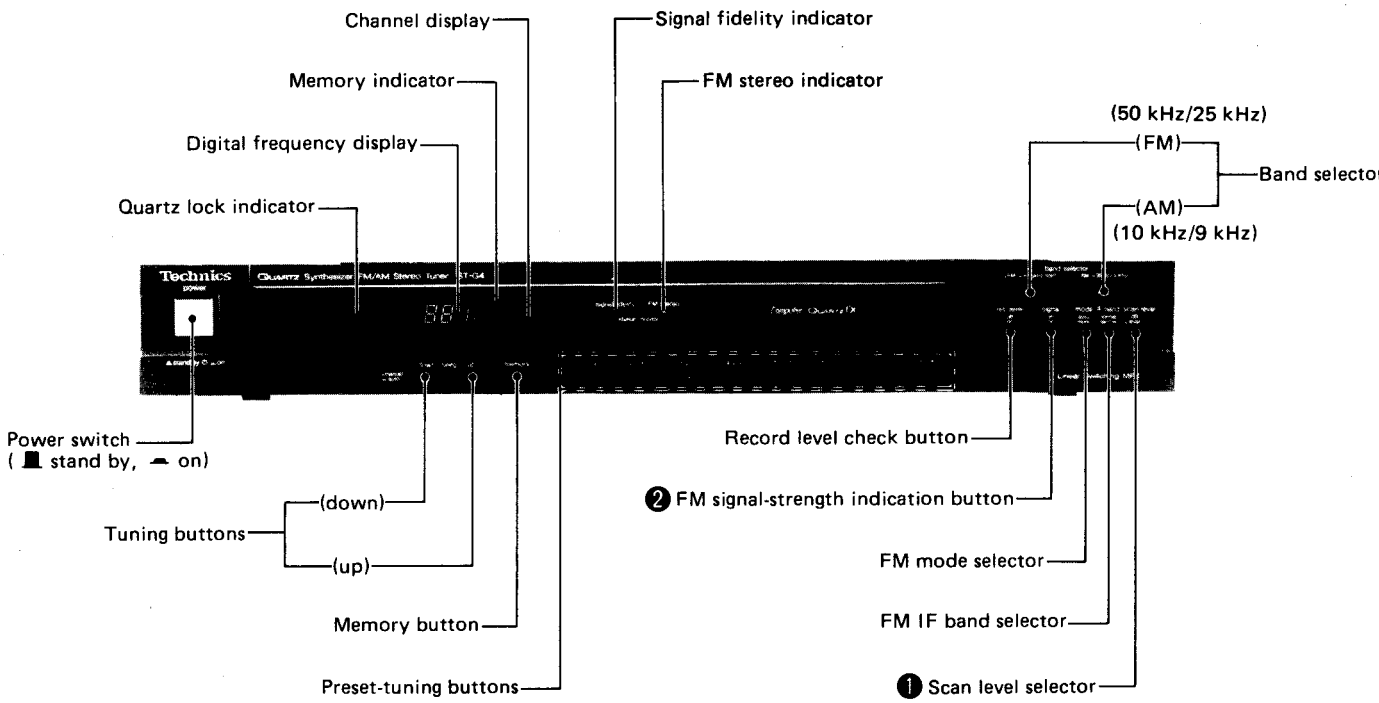
■ LOCATION OF CONTROLS



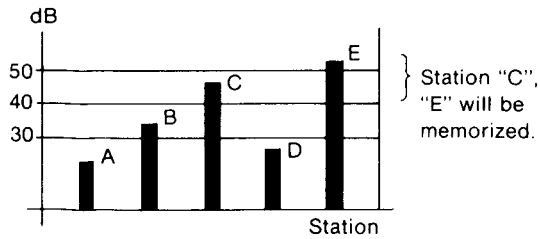
❶ Scan level selector (scan level)

This button is used for the setting of the level of the reception signal during automatic FM tuning.

When this button is pressed continuously, numerals (30, 40, 50) will appear in the digital display; release the button at the desired display.

After the desired scan level has been selected, it will then be possible to tune to and receive broadcasts of this level or higher, and to enter (into the memory) stations with high levels.

- **Example if set to the 40-dB level (applicable to automatic tuning only)**

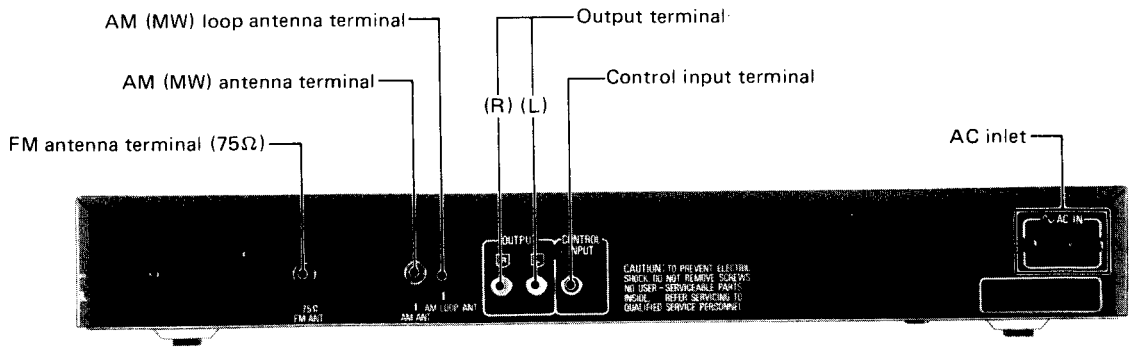


❷ FM signal-strength indication button (signal)

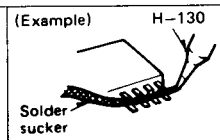
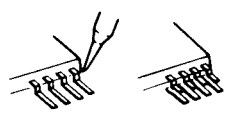
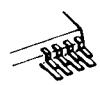
If this button is pressed during reception of an FM broadcast, the signal strength (the strength of the signal of the broadcast being received) will be displayed within a 2 dB accuracy.

If the strength of the signal being received is 50 dB/75Ω or more, a symbol (■) will appear between the number and dB to indicate that a strong signal of 50 dB/75Ω or more is being received. The signal will become saturated at 50 dB or more.

In order to resume the frequency display, press the button once again.



■ HOW TO REPLACE IC'S (Small outline type)

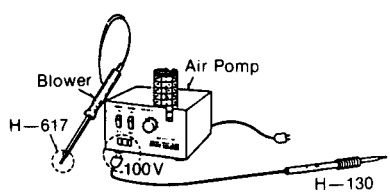
	Replacing procedure		Cautions
1	Reduce the amount of solder on each pin of the integrated circuit by use of a solder sucker.	(Example) H—130 	• **Recommended tool** .....Special soldering iron *H605M and H—130. *H605E and H—130. • **Do not touch the soldering iron to the area for a long time. It may otherwise cause removal of the print foil.** • **When shifting the pin upward, do the job quickly while the solder is melting. If the solder is hard, it may cause removal or breakage of the print foil.** • When using a pencil type soldering iron. 1. Completely remove the solder from each IC pin by use of solder sucker. 2. Raise each pin by means of an eyeleteer, hold the pliers then remove IC package from P.C.B.
2	Melt the solder on the pin (one electrode) with the soldering iron.		
3	While the solder is melting, shift the pin upward by the soldering iron to remove it from the foil.		
4	Remove each pin from the foil according to the above-mentioned procedure.		

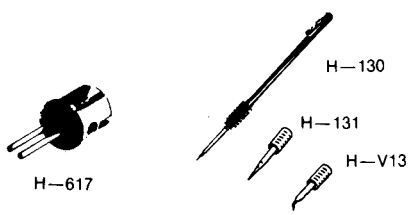
*** Special soldering iron**
(Refer to Technical Information, ORDER NO. GAD84125486T1)...For U.S.A. and Canada
(Refer to Technical Information, ORDER NO. GAD84115476T8)...For others

- **H—605 Spot Heater (hot-air solder iron)**

This device that uses hot air to melt solder was developed to remove Flat-Pakage ICs, RHCs and chip parts.

- H—605M (For 120V power source)
- H—605E (For 200V/220V/240V power source)





- **H—617 Twin Nozzle (for spot heater)**

Special nozzle for the removal of RHCs and chip resistors.
(Nozzle diameter : 1.0 mm x 2)

- **H—130 Slim Pencil Solder Iron**

An ultrasmall ceramic heater solder iron is extremely handy for soldering chip parts, RHCs, ICs, etc., to high-density circuit boards.
Features:

- Rated power: 100V, 15W
- Max. temp.: 400°C
- Heater: ceramic (long life)
- Insulation resistance: 100MΩ
- Length: 178 mm
- Weight: 16 g (not including cord)

- **H—131, H—V13 Cap Bits**

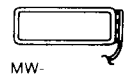
Solder tip for the slim pencil Solder Iron and is composed of a bit holder and a corrosion resistance solder tip.
Permits changing of solder tips even while still hot.

- Solder tip: 0.3 mm

■ VORABSTIMMUNG DER EMPFANGSFREQUENZEN

Es können bis zu 16 UKW- und MW-Empfangsfrequenzen vorabgestimmt werden. Nachdem die Frequenzen auf unten beschriebene Weise voreingestellt wurden, brauchen Sie nur die betreffende Taste zu drücken, um den gewünschten Sender abzustimmen.

Wichtig!



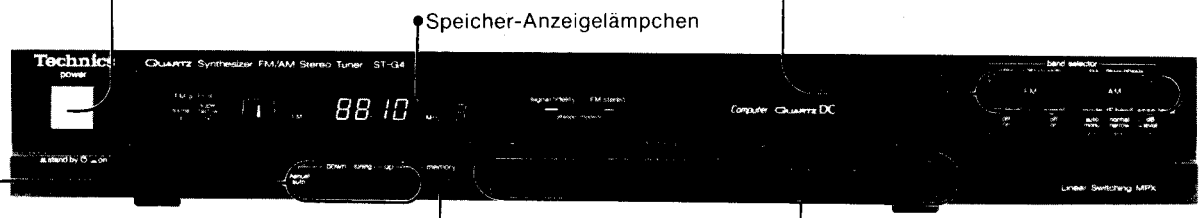
Wenn diese Antenne unsachgemäß installiert ist, können keine MW-Programme empfangen werden.

• Automatische Vorabstimmung

Beginnend mit der tiefsten Empfangsfrequenz werden von der angezeigten Frequenz weg die UKW- bzw. MW-Sender automatisch in die „Kanäle" 1 bis 16, bzw. 9 bis 16 abgespeichert.
Beachten Sie, daß in gebirgigen oder sehr entlegenen Orten Sender mit schwachen Empfangssignalen nicht automatisch vorabgestimmt werden können.

1 Drücken.
(Die UKW-bzw. MW-Frequenz wird angezeigt.)

2 Die „FM (UKW)"- oder „AM (MW)"-Taste drücken.
Stellen Sie vor der Vorabstimmung der Sender das entsprechende Frequenzintervall für Ihr Land ein.

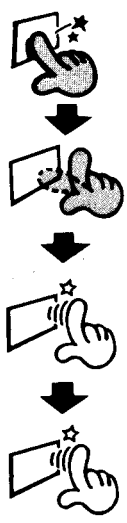


3 Stellen Sie auf die kleinste Frequenz ein.
- **FM: 87,50 MHz**
- **MW: 522 kHz** (9 kHz-Schritte) **oder 530 kHz** (10 kHz-Schritte)

① Die Taste Drücken und in dieser Stellung halten (die Frequenz ändert sich laufend)

② Die Taste bei 87,50 MHz auf UKW oder 522 kHz (oder 530 kHz) auf MW loslassen, und die Taste nochmals kurz antippen (die Frequenz ändert sich nicht mehr).

③ Die Taste kurz antippen (Frequenzänderung bei jedem Antippen der Taste), um die oben aufgeführten Frequenzen einzustellen.



4 Drücken. Loslassen, sobald das Spiecheranzeigelämpchen verlischt.

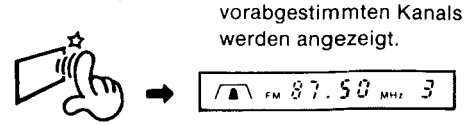
(Die Frequenz läuft nach oben und die automatische Vorabstimmung beginnt mit dem Sender mit der niedrigsten Frequenz.)

5 Tragen Sie die Namen (Rufzeichen usw.) der vorabgestimmten Sender und die „Kanalnummer" in die Tabelle ein.

- **Überprüfen der vorderen Kanäle (1 ~ 8):**

Kurz antippen.

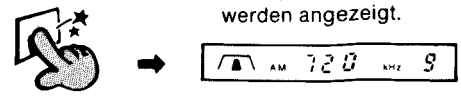
Die abgespeicherte Frequenz und die Nummer des vorabgestimmten Kanals werden angezeigt.



- **Überprüfen der hinteren Kanäle (9 ~ 16):**

Etwas länger drücken.

Die abgespeicherte Frequenz und die Nummer des vorabgestimmten Kanals werden angezeigt.



• Manuelle Vorabstimmung

Die Sender können in jeden beliebigen „Kanal" abgespeichert werden.

1 **Drücken.**
(Die UKW- bzw. MW-Frequenz wird angezeigt.)

2 **Die „FM (UKW)"- oder „AM (MW)"-Taste drücken.**
Stellen Sie vor der Vorabstimmung der Sender das entsprechende Frequenzintervall für Ihr Land ein.

• Speicher-Anzeigelämpchen

3 **Mit der geeigneten Abstimmtaste die Empfangsfrequenz abstimmen.**

• **Automatische Abstimmung**
Die Taste drücken. Sobald die Frequenz zu laufen beginnt, die Taste loslassen (ein Sender wird automatisch abgestimmt). Diesen Vorgang so oft wiederholen, bis der gewünschte Sender abgestimmt ist.

• **Manuelle Abstimmung**
Die Taste kurz antippen (bei jedem Antippen der Taste ändert sich die Frequenz), um den gewünschten Sender abzustimmen.

4 **Kurz antippen.**
(Das Speicher-Anzeigelämpchen leuchtet für ungefähr 4 Sekunden.)

Bemerkung:
Falls die Taste länger gedrückt und wieder losgelassen wird ändert sich die Frequenz und die automatische Vorabstimmung beginnt.
Die automatische Vorabstimmung kann durch nochmaliges Drücken der Tasten „up" oder „down" unterbrochen werden.

5 **Während das Speicher-Anzeigelämpchen leuchtet, die für diese Frequenz bestimmte Vorabstimmtaste drücken.**

• **Vorabstimmen der „Kanäle" 1 bis 8:**

Die Taste nur kurz antippen. (Die Nummer des vorab gestimmten Kanals wird angezeit.)

• **Vorabstimmen der „Kanäle" 9 bis 16:**

Die Taste etwas länger drücken. (Die Nummer des vorab gestimmten Kanals wird angezeit.)

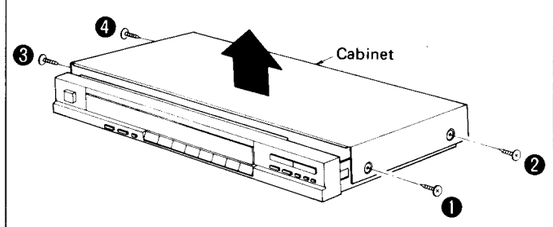
Sobald die Taste gedrückt wird, erlischt das Speicher-Anzeigelämpchen, und die Vorabstimmung ist beendet.

Bemerkungen:
1. Falls das Speicher-Anzeigelämpchen erlischt, bevor Sie die Taste drücken, müssen Sie die Schritte ④ und ⑤ wiederholen.
2. Wenn neue Sender gespeichert werden, wird der auf diesem „Kanal" schon abgespeicherte Sender gelöscht.

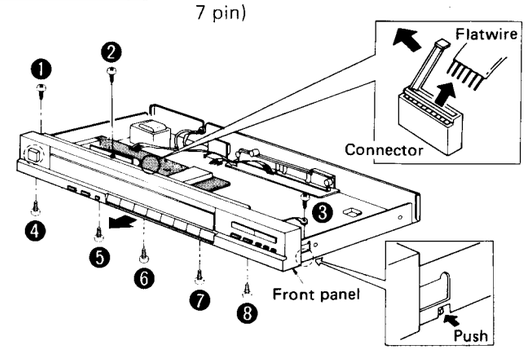
6 **Tragen Sie die Namen (Rufzeichen usw.) der vorabgestimmten Sender in eine Tabelle ein.**
Damit ist die Vorabstimmung der Empfangsfrequenz abgeschlossen. Die anderen Vorabstimmtasten können auf die gleiche Weise (Schritte ② bis ⑤) voreingestellt werden.

■ DISASSEMBLY INSTRUCTIONS

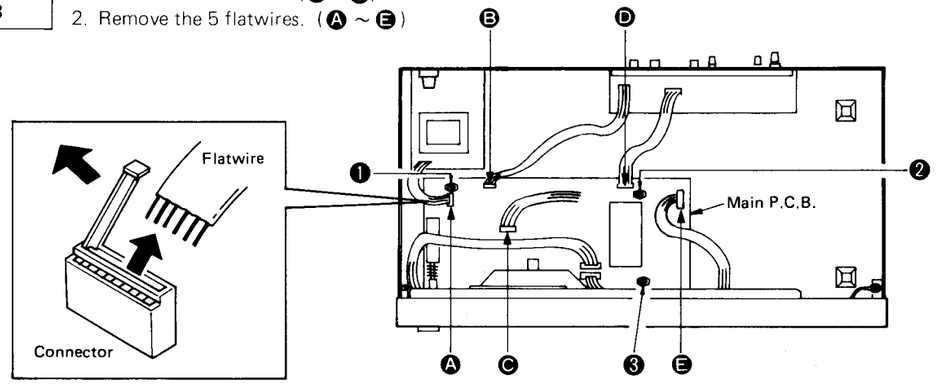
Ref. No. 1	How to remove the cabinet
Procedure 1	• Remove the 4 screws. (❶ ~ ❹)



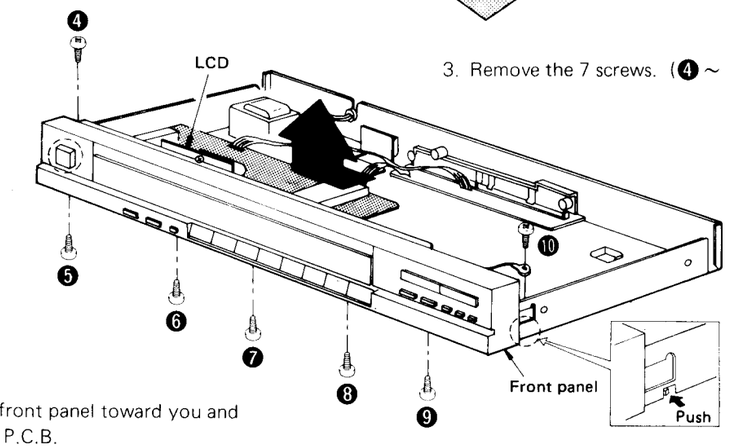
Ref. No. 2	How to remove the front panel
Procedure 1 → 2	1. Remove the 8 screws. 2. Remove the 2 flatwires. (9 pin and 7 pin)



Ref. No. 3	How to remove the main P.C.B.
Procedure 1 → 3	1. Remove the 3 screws. (❶ ~ ❸) 2. Remove the 5 flatwires. (Ⓐ ~ Ⓔ)



3. Remove the 7 screws. (❹ ~ ❿)



4. Slightly pull the front panel toward you and remove the main P.C.B.

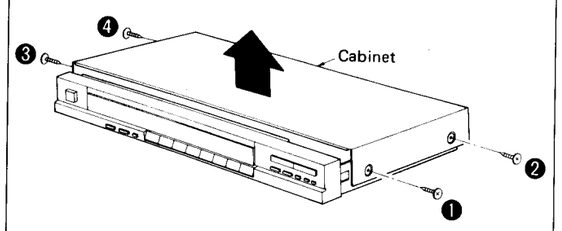
Ref. No. 4	
Procedure 1 → 3 → 4	

Ref. No. 5	
Procedure 1 → 3 → 4 →	

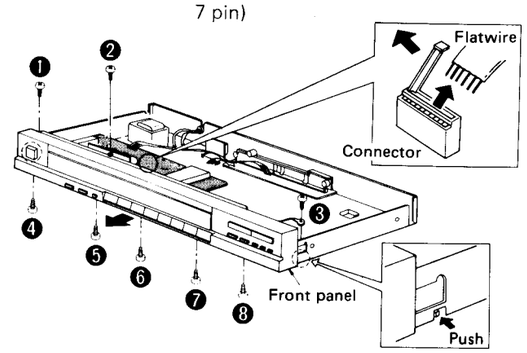
Tun

■ DISASSEMBLY INSTRUCTIONS

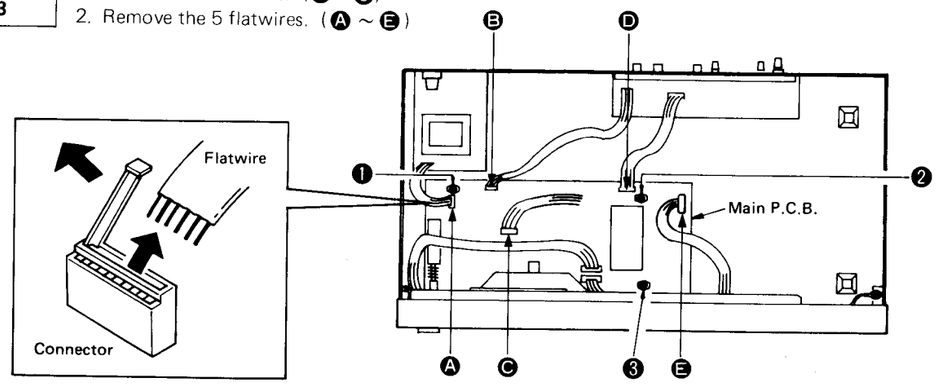
Ref. No. 1	How to remove the cabinet
Procedure 1	• Remove the 4 screws. (❶ ~ ❹)



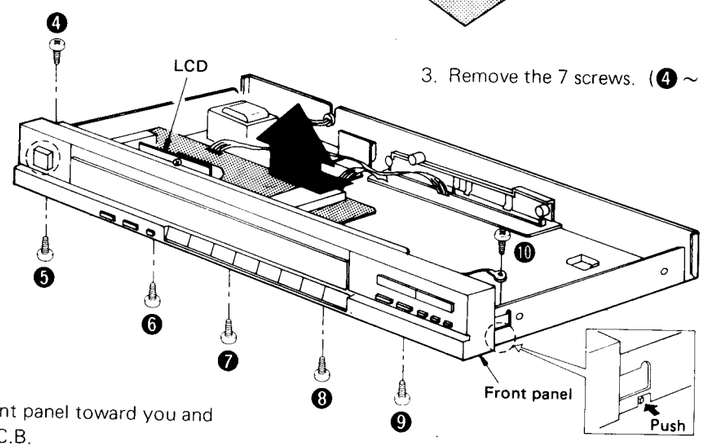
Ref. No. 2	How to remove the front panel
Procedure 1 → 2	1. Remove the 8 screws. 2. Remove the 2 flatwires. (9 pin and 7 pin)



Ref. No. 3	How to remove the main P.C.B.
Procedure 1 → 3	1. Remove the 3 screws. (❶ ~ ❸) 2. Remove the 5 flatwires. (Ⓐ ~ Ⓔ)

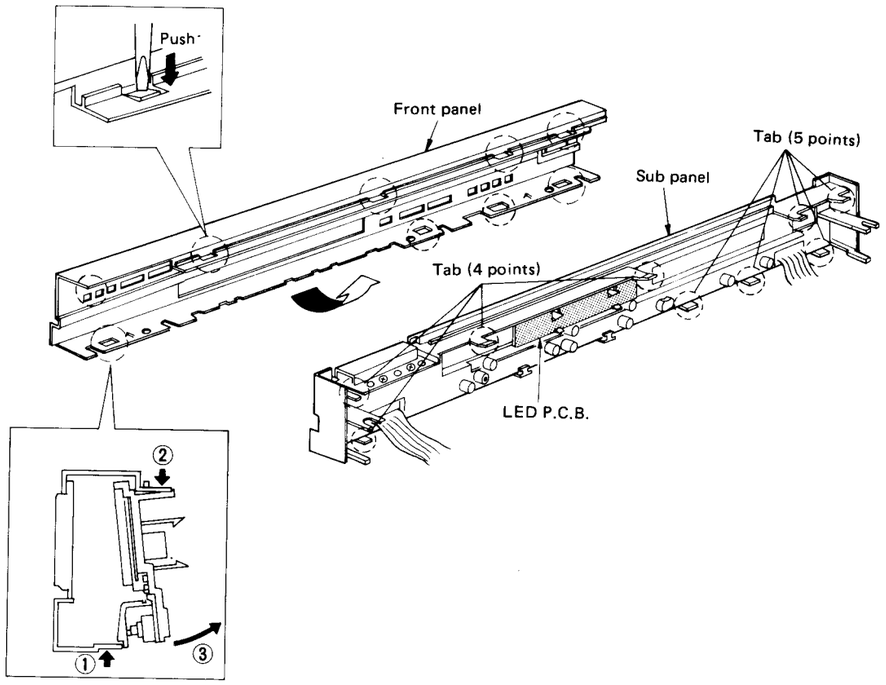


3. Remove the 7 screws. (❹ ~ ❿)

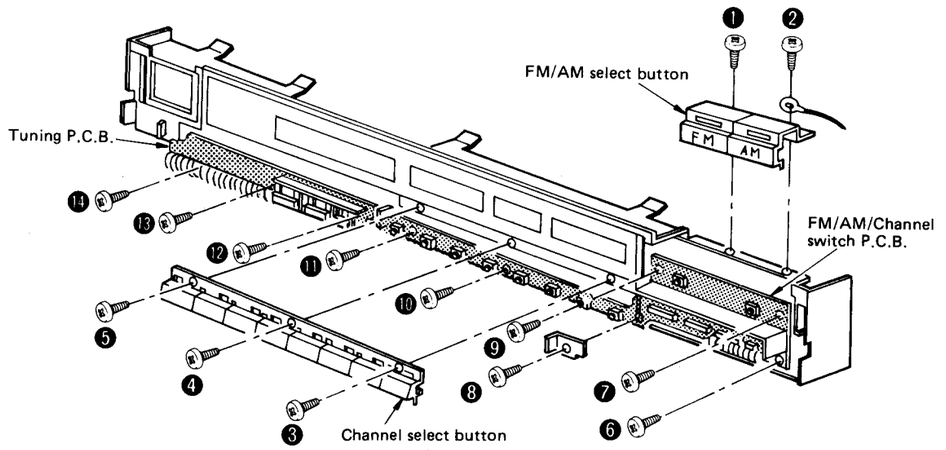


4. Slightly pull the front panel toward you and remove the main P.C.B.

Ref. No. 4	How to remove the sub panel
Procedure 1→3→4	• Push out the 9 tabs on the bottom and top side of the sub panel by used blade (⊖) screwdriver.



Ref. No. 5	How to remove the FM/AM/Channel switch P.C.B. and Tuning P.C.B.
Procedure 1→3→4→5	• Remove the 12 screws.



■ MESSUNGEN UND JUSTIERUNGEN

MW/UKW

Einstellungen der Bedienelemente und zu verwendende Geräte.

- MW/UKW-Meßsender (MW/UKW-MS)
- Stereo-Modulator
- Oszilloskop
- Elektronische Wechselstrom- und Gleichstrom-Voltmeter (EVM).
- Frequenzzähler
- Drosselspule (100μH)
- Widerstand (100kΩ)
- Keramischer Kondensator (200pF)

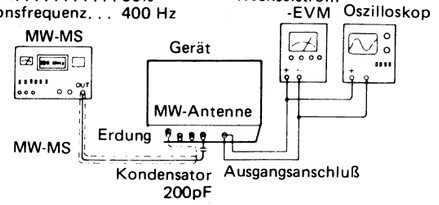
Anmerkung: Für **T201** (MW-ZFT) und **L203** (MW-OSZ-Spule) werden bereits justierte Ersatzteile geliefert. Die Kerne dieser Teile daher nicht drehen.

MW-HF-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "**MW**" einstellen.
3. Die Radiofrequenzanzeige und den Meßsender auf 612 kHz einstellen.
4. **L202** auf maximale Ausgangsleistung abgleichen.
5. Die Radiofrequenzanzeige und den Meßsender auf 1503 kHz einstellen.
6. **CT201** auf maximale Ausgangsleistung abgleichen.
7. Die Schritte 3—6. wiederholen.

Anmerkung: Der Antenneneingang-Signalpegel muß so niedrig wie möglich und frei von automatischer Verstärkungsregelung (AGC) sein.

ZUSTAND DES MW-MESSENDERS
Modulation. 30%
Modulationsfrequenz. . . 400 Hz

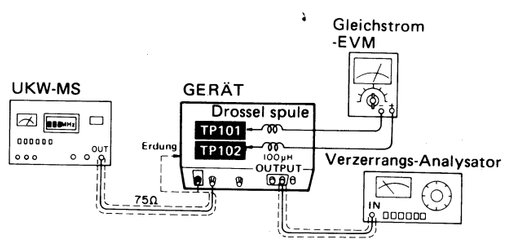


UKW-MONO-VERZERRUNGS-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "**FM**" einstellen.
3. Die Radiofrequenzanzeige und den Meßsender auf **100.10 MHz** einstellen.
4. Den Kern von **T101** so justieren, daß die im Signalzustand gemessene Spannung **0 mV (0 ± 50 mV)** im 300 mV-Bereich beträgt.
5. **T102** so justieren, daß der Verzerrungsfaktor des linken Kanals minimal wird.
6. Schritte 4 und 5 einige Male wiederholen.
7. Überprüfen, daß die Verzerrungsfaktoren des linken und rechten Kanals fast gleich sind.

Anmerkung: Für die Justierung ist ein Schraubendreher aus Kunststoff zu verwenden.

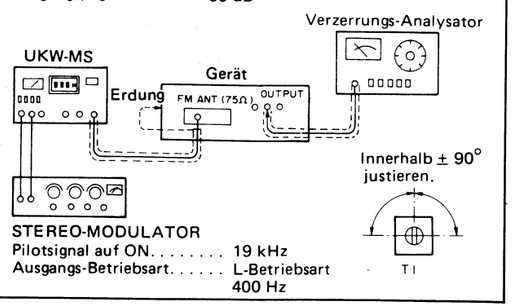
ZUSTAND DES UKW-MESSENDERS
Modulation 100%
Modulationsfrequenz. . . 400 Hz
Ausgangspegel. . . . . 66 dB



UKW ZFT JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Den UKW-Betriebsart-Wahlschalter in die "**FM auto**"-Position stellen.
3. Die Radiofrequenz-Anzeige und der Meßsender auf **100,10 MHz** einstellen.
4. **T1** so justieren, daß der Verzerrungsfaktor des linken Kanals minimal wird.
5. Überprüfen, daß die Verzerrungsfaktoren des linken und rechten Kanals fast gleich sind.

ZUSTAND DES UKW-MESSENDERS
Modulation . . . . . 90% (Pilotsignal 10%)
Modulationsfrequenz. . . . "L" Betriebsart 400 Hz (Pilot 19 kHz)
Ausgangspegel. . . . . 66 dB

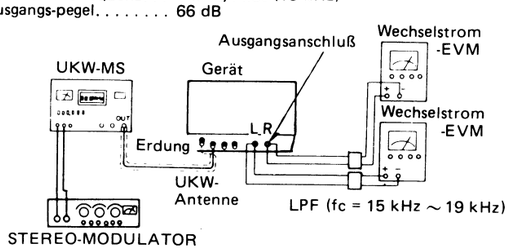


STEREO-MODULATOR
Pilotsignal auf ON. . . . . 19 kHz
Ausgangs-Betriebsart. . . . . L-Betriebsart 400 Hz

TRENNUNGS-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "FM" einstellen.
3. Die Radiofrequenzanzeige und den Meßsender auf 100,10 MHz einstellen.
4. **VR301** so justieren, daß der R-Ausgang minimal ist, wenn der Stereomodulator im L-Betriebszustand (Linker Kanal moduliert) ist.

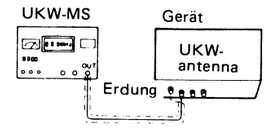
ZUSTAND DES UKW-MESSENDERS
Modulation. . . . . "L" order "R" Betriebsart 90%, Pilotsignal 10%
Modulationsfrequenz. . . 1 kHz, Pilot (19 kHz)
Ausgangs-pegel. . . . . 66 dB



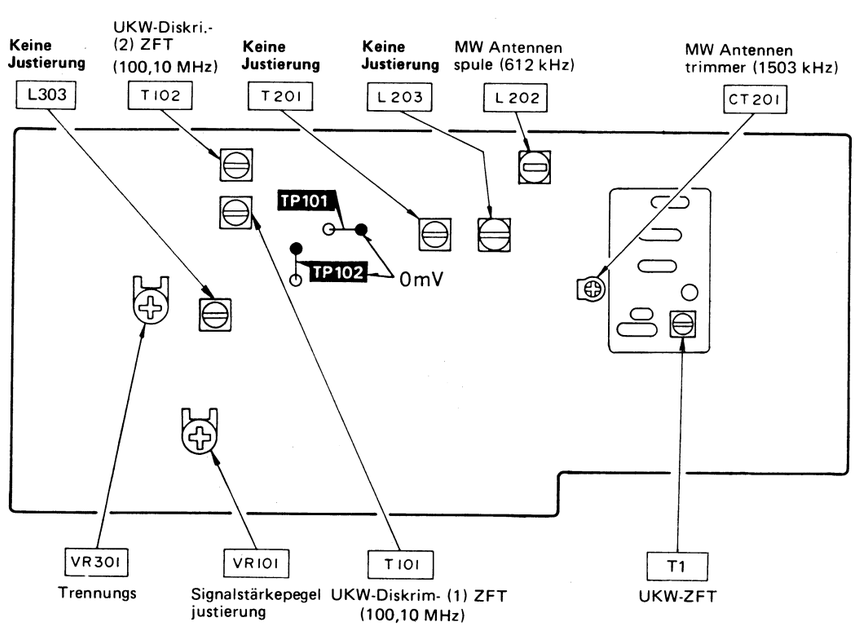
SIGNALSTÄRKEPEGEL-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "FM" einstellen.
3. Die Radiofrequenzanzeige und den Meßsender auf 100,10 MHz einstellen.
4. Die Flüssigkristallanzeige-Betriebsart von "**Frequenz**" auf "**dB**" umschalten, durch Drücken der UKW-Signaltaste.
5. **VR101** so justieren, daß 54 dB angezeigt wird.
6. Überprüfen, daß der Signalstärkepegel **22 ~ 38 dB** beträgt, wenn die Eingangsleistung **30 dB** ist.

ZUSTAND DES UKW-MESSENDERS
Modulation. 30%
Modulationsfrequenz. . . 400 Hz
Ausgangs-pegel. . . . . 66 dB

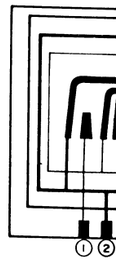


• Zu justierende Punkte

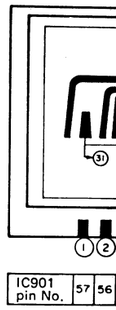


■ DESCRIPTION

• COMMON

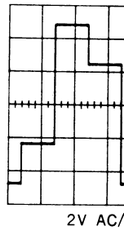


• SEGMEN



< Segm

Pin ① or ② of LC

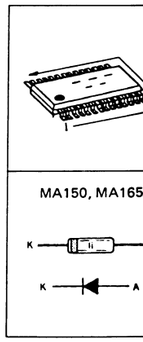


2V AC/

• Each segment

Note: Potential di
is measured
So, do not c
the oscillosc
If the earth

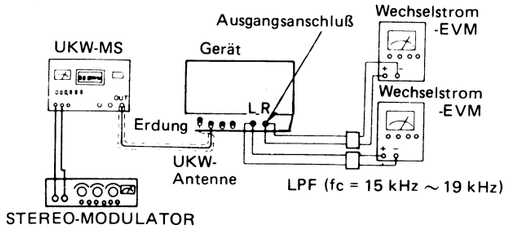
■ TERMINAL GU



TRENNUNGS-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "FM" einstellen.
3. Die Radiofrequenzanzeige und den Meßsender auf 100,10 MHz einstellen.
4. **VR301** so justieren, daß der R-Ausgang minimal ist, wenn der Stereomodulator im L-Betriebszustand (Linker Kanal moduliert) ist.

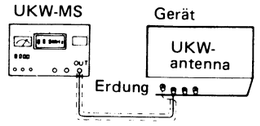
ZUSTAND DES UKW-MESSENDERS
Modulation. . . . . "L" order "R" Betriebsart 90%, Pilotsignal 10%
Modulationsfrequenz. . . 1 kHz, Pilot (19 kHz)
Ausgangs-pegel. . . . . 66 dB



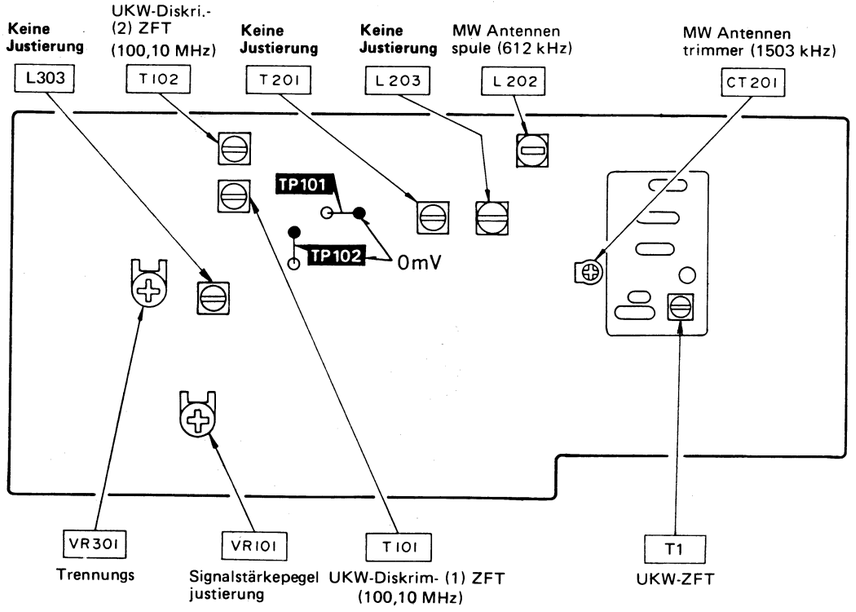
SIGNALSTÄRKEPEGEL-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Das Gerät auf "FM" einstellen.
3. Die Radiofrequenzanzeige und den Meßsender auf 100,10 MHz einstellen.
4. Die Flüssigkristallanzeige-Betriebsart von "**Frequenz**" auf "**dB**" umschalten, durch Drücken der UKW-Signaltaste.
5. **VR101** so justieren, daß 54 dB angezeigt wird.
6. Überprüfen, daß der Signalstärkepegel **22 ~ 38 dB** beträgt, wenn die Eingangsleistung **30 dB** ist.

ZUSTAND DES UKW-MESSENDERS
Modulation. 30%
Modulationsfrequenz. . . 400 Hz
Ausgangs-pegel. . . . . 66 dB

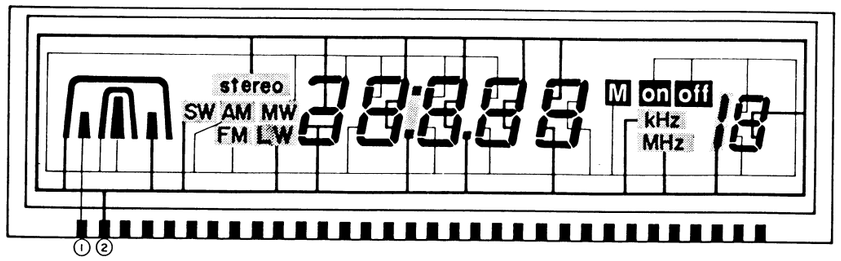


- **Zu justierende Punkte**

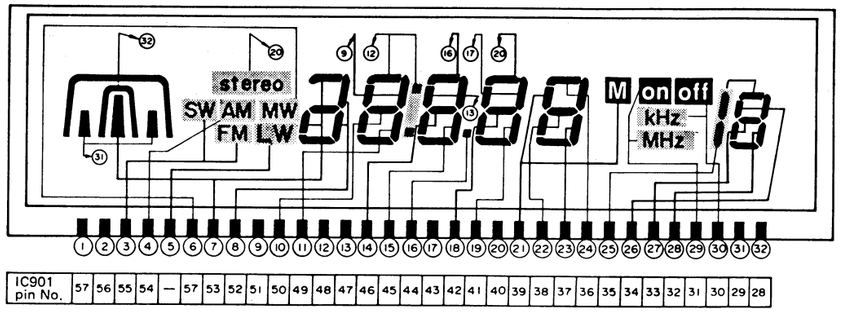


■ DESCRIPTION OF LCD PANEL

- **COMMON**



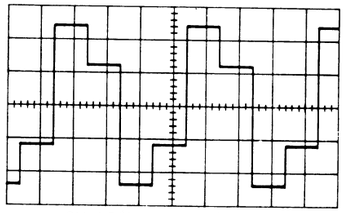
- **SEGMENT**



IC901 pin No.	57	56	55	54	—	57	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28

< Segment ON >

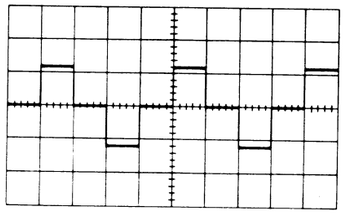
Pin ① or ② of LCD and each segment terminal.



2V AC/DIV, 5m sec/cm

< Segment OFF >

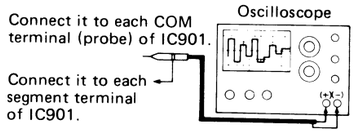
Pin ① or ② of LCD and each segment terminal.



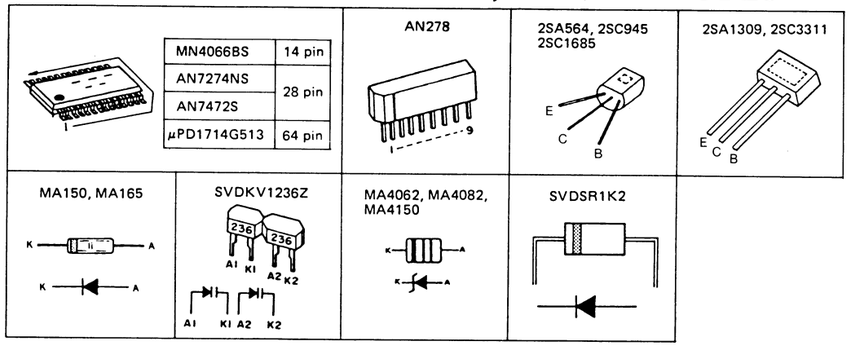
2V AC/DIV, 5m sec/cm

- **Each segment waveform measuring method**

Note: Potential difference from COM terminal waveform is measured for each segment output waveform. So, do not connect the earth to other equipment on the oscilloscope side.
If the earth is connected, IC901 will break down.



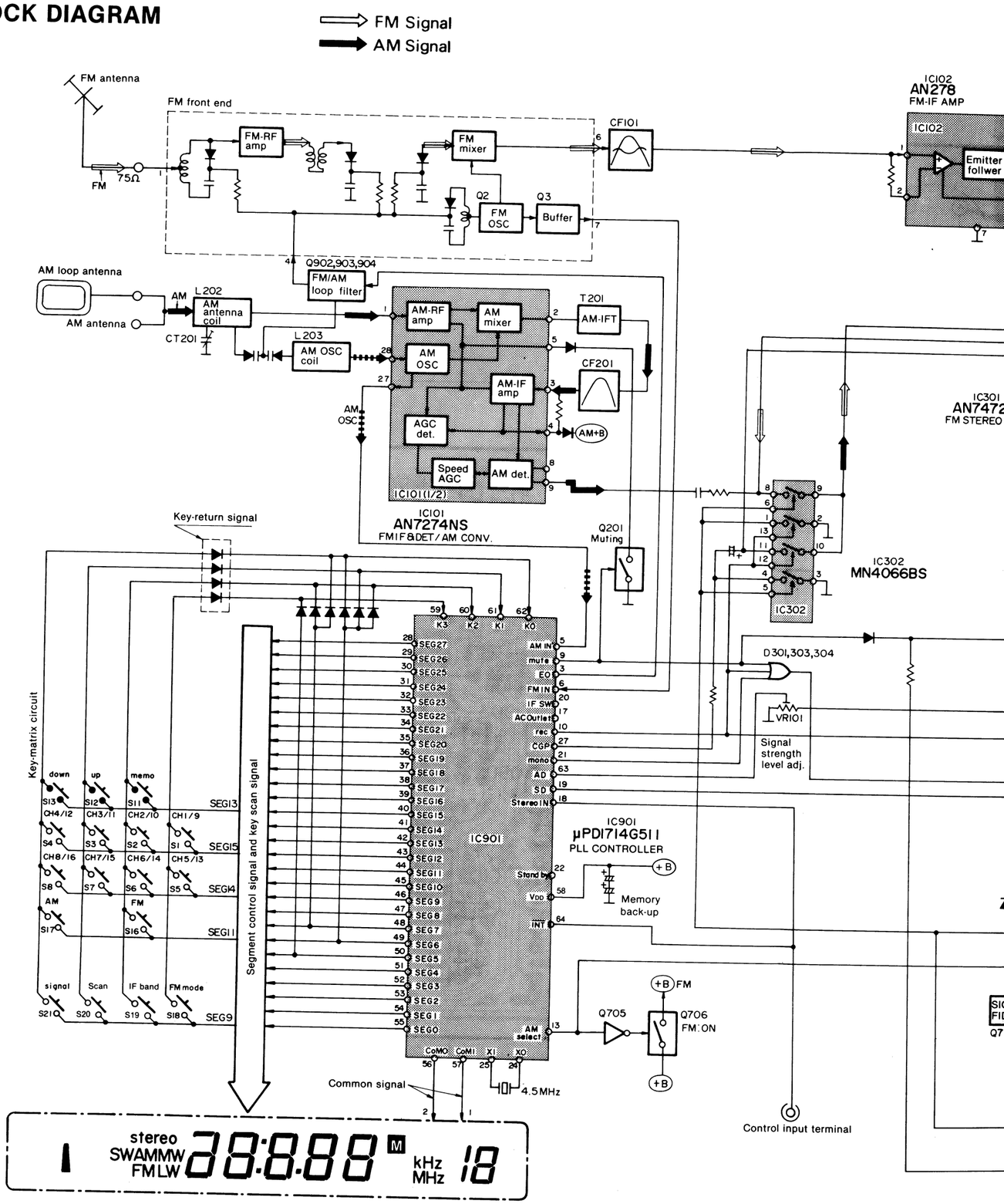
■ TERMINAL GUIDE OF TRANSISTORS, IC'S AND DIODES



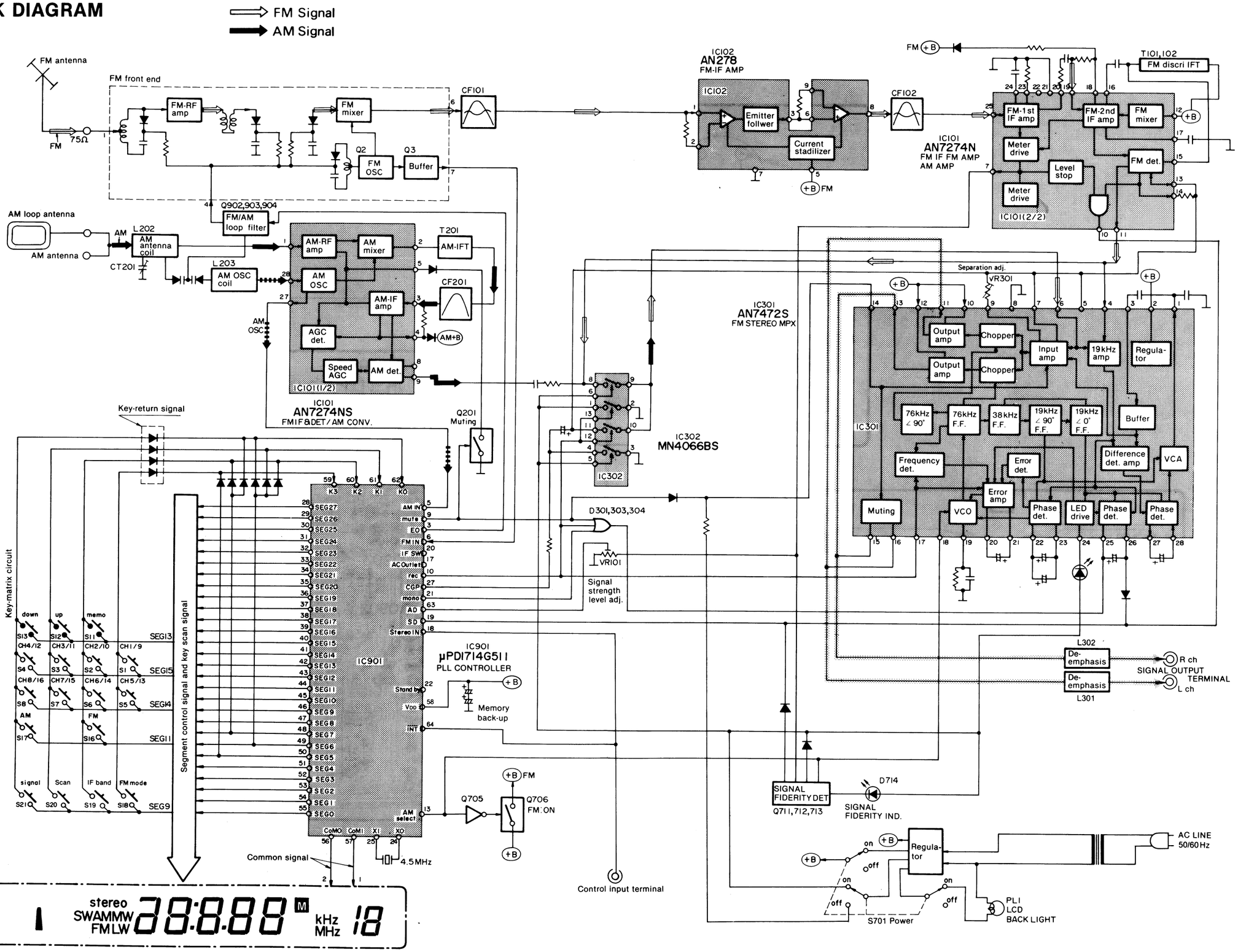
■ FUNCTION OF TERMINAL (IC901: μPD1714G513)

Pin No.	IN/OUT	Mark	Description of terminal
1	——	NC	Not used in this unit.
2	——	EO1	Not used in this unit.
3	OUTPUT	EO2	The frequency is output as a result of comparison between LCD frequency and FM or AM station frequency.
4	——	GND	Ground terminal.
5	INPUT	AM	Input for AM OSC output. 1.84V / 1.87V / 522kHz / 1629kHz
6	INPUT	FM	Input for FM OSC output frequency divided to 1/32 or 1/33 by pre-scaler.
7	INPUT	CE	Power supply detection. "H" input with it connected to home-use power outlet socket. H → 4V, L → 0V
8	——	GND	Ground terminal.
9	OUTPUT	MUTE	This is the output terminal to eliminate shock noise due to unlocking at PLL. <Muting output> 1. Pin 7 (CE) is L → H or H → L. 2. Power switch "off". 3. Frequency change. (up/down, FM ↔ AM, REC). 4. FM IF selection. 4.8V / 0V Muting output operation
10	——	REC	This is the output terminal to REC carriburation (333 Hz) signal. 1. REC (for REC level check) switch "ON" mode → H (4.8V) 2. REC (for REC level check) switch "OFF" mode → L (0V)
11	——	SDC	Not used in this unit.
12	——	RFATT	
13	INPUT	AM	AM selector. H (4.8V) → AM
14	——	FM	Not used in this unit.
15	——	LW	
16	——	SLEEP	
17	——	POWER	
18	INPUT	STEREO	Stereo indicator drive. L (0) — Stereo indicator light up.
19	INPUT	SD	Station detection 1. Signal received → H (5V) 2. NO signal → L (0V)
20	——	WIDE	FM IF range selection. 1. Super narrow mode → L (0V) 2. Normal mode → H (4.7V)
21	OUTPUT	MONO	Forcible monaural selection. 4.7V / 0V Forcible monaural mode
22	——	STANDBY	Not used in this unit.
23	——	SO	
24	OUTPUT	X OUT	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
25	INPUT	X IN	
26	INPUT	V_{DD}	**Power supply terminal (4.7V)**
27	OUTPUT	CGP	Clock pulse waveform output.
28 ~ 39	OUTPUT	S27 ~ S16	Segment signal output for LCD display.
40 ~ 55	OUTPUT	S15 ~ S0	Segment signal output and key source signal output for LCD display. LCD seg / KS / 333μs / 10ms LCD seg : LCD display data KS : Key source data
56	OUTPUT	COM 0	Common of LCD.
57		COM 1	
58	INPUT	V_{DD}	Power supply terminal. (4.7V)
59 ~ 62	INPUT	K3 ~ K0	Input terminal for key return signal from external key matrix.
63	INPUT	SSL	Electromagnetic field intensity level input is changed from analog to digital.
64	INPUT	INT	Interrupt requesting signal input terminal. Signal from control input terminal is put into this terminal. Detected when input is "L". Band det. 125 msec / 625msec / 18msec / 580msec / 200msec / CH det.

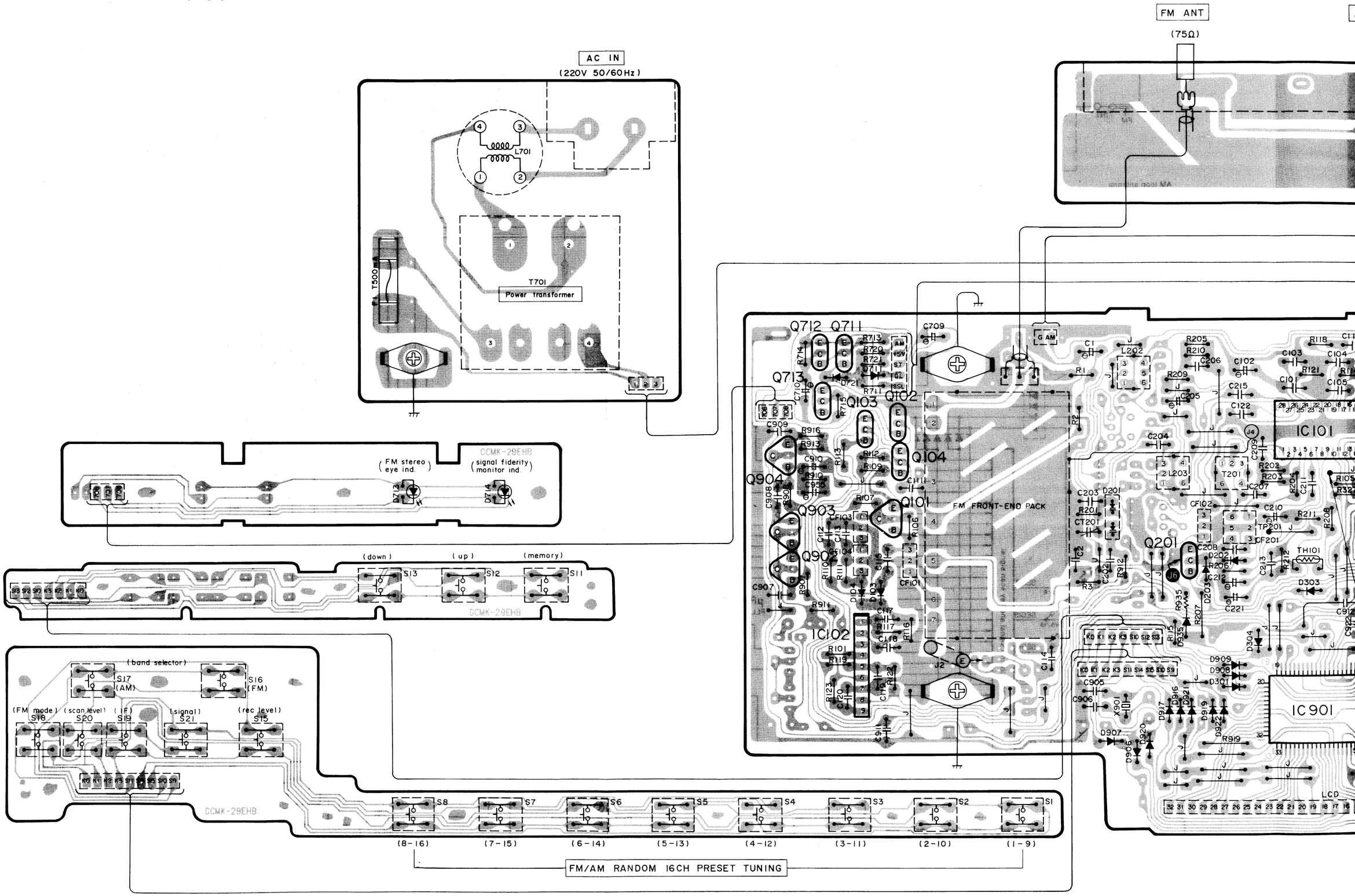
■ BLOCK DIAGRAM

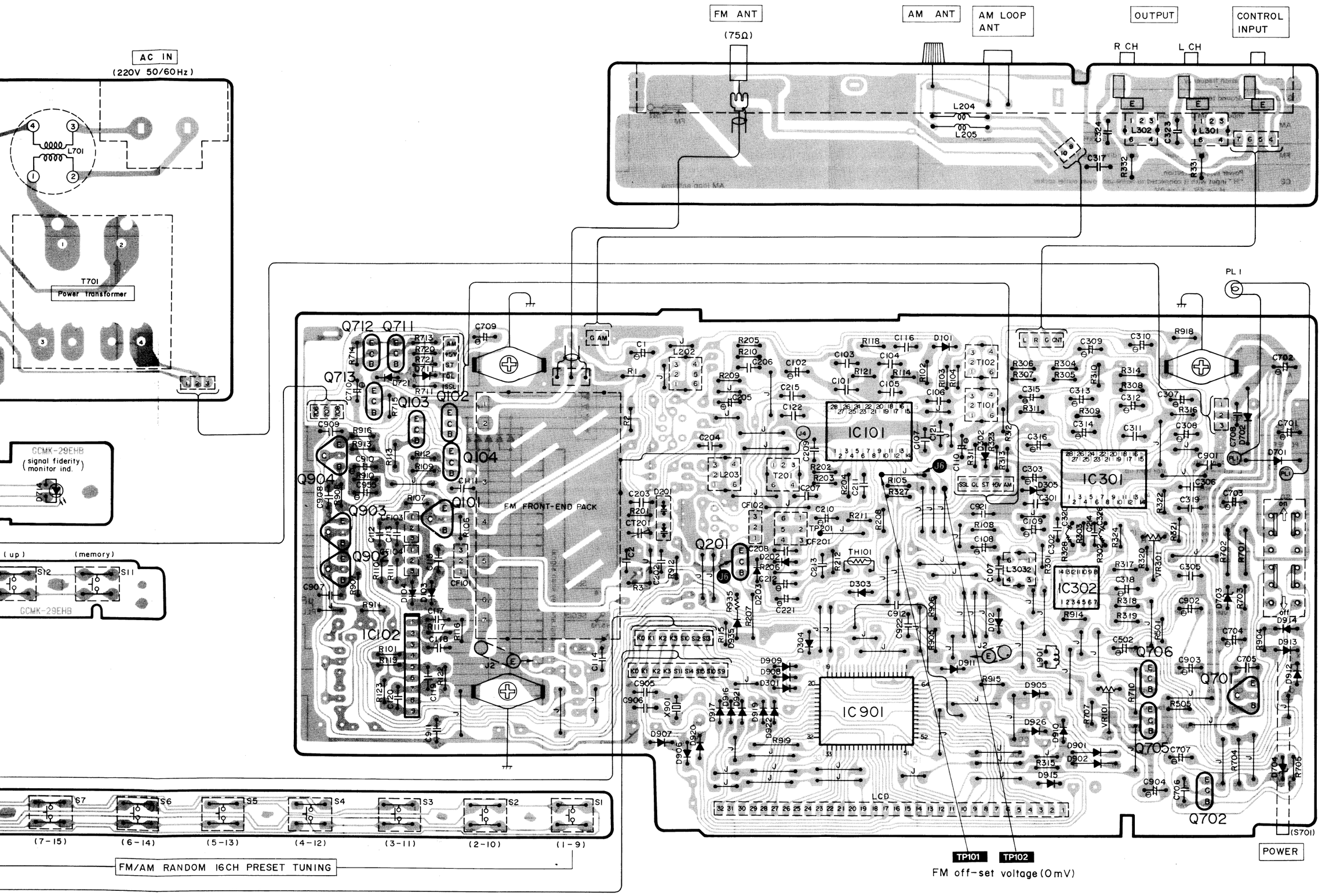


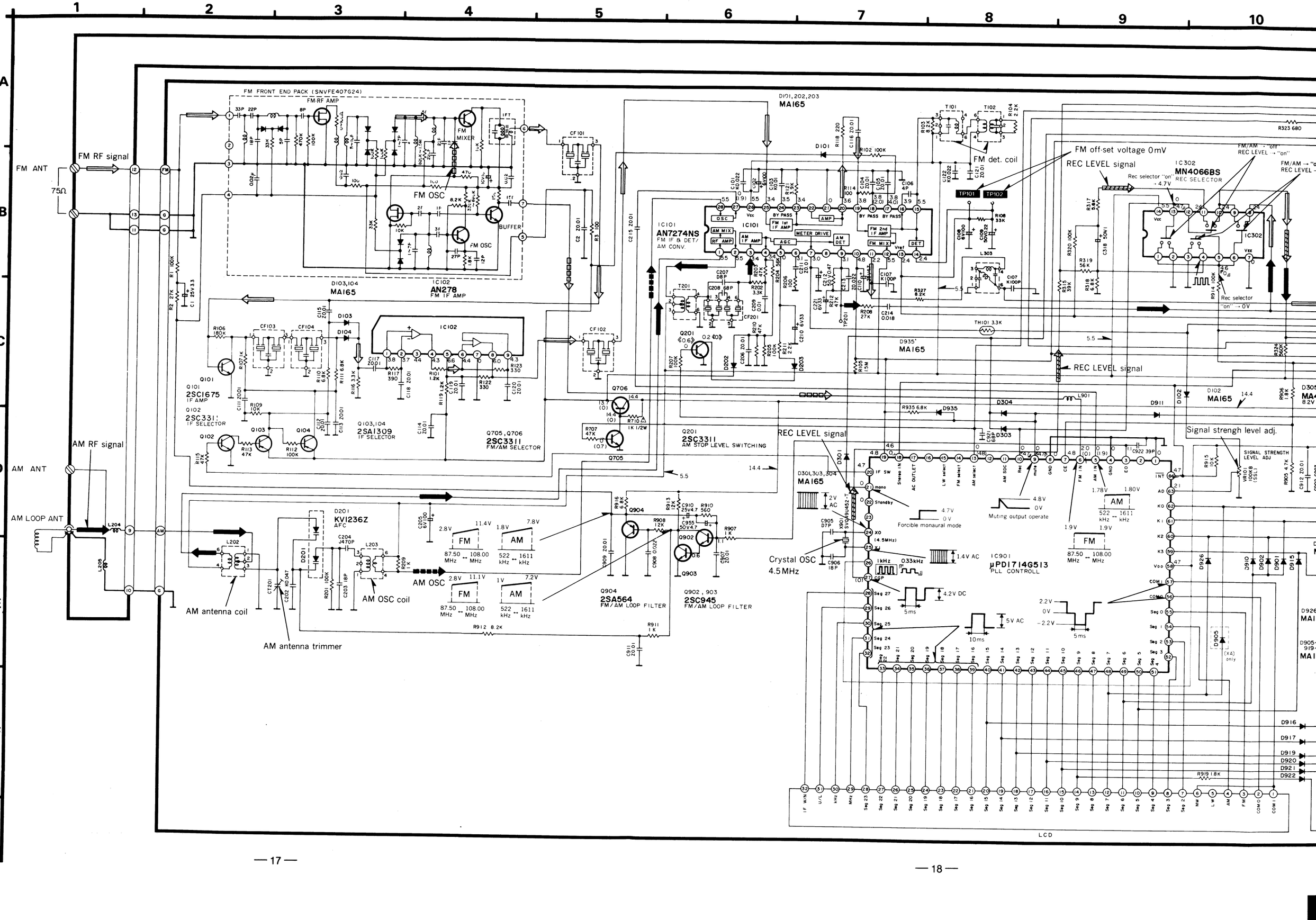
■ BLOCK DIAGRAM

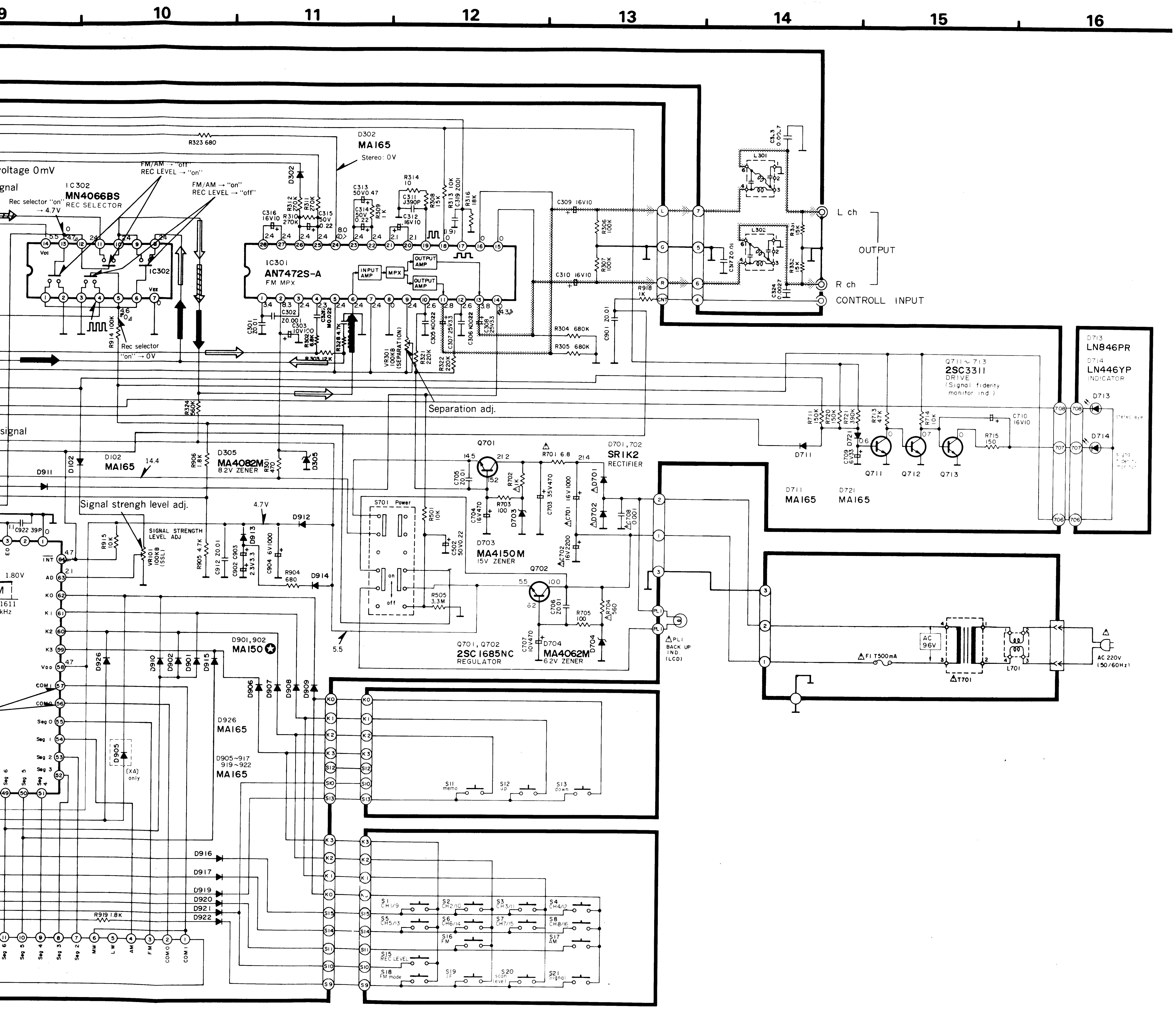


■ CIRCUIT BOARD AND WIRING CONNECTION




AC IN
(220V 50/60Hz)
L701
T701
Power transformer
GCMK-29EHB
(signal fidelity monitor ind.)
(up)
(memory)
S12
S11
GCMK-29EHB
S7
S6
S5
S4
S3
S2
S1
(7-15)
(6-14)
(5-13)
(4-12)
(3-11)
(2-10)
(1-9)
FM/AM RANDOM 16CH PRESET TUNING
FM ANT
(75Ω)
AM ANT
AM LOOP ANT
OUTPUT
R CH
L CH
CONTROL INPUT
L204
L205
L302
L301
C324
C323
C317
R332
R331
PL1
FM FRONT-END PACK
IC101
IC301
IC302
IC901
IC102
Q712
Q711
Q713
Q102
Q103
Q104
Q101
Q904
Q903
Q902
Q201
Q706
Q701
Q705
Q702
TP101
TP102
FM off-set voltage (0mV)
POWER
(S701)


FM FRONT END PACK (SNVFE407G24)
FM RF AMP
FM MIXER
FM OSC
BUFFER
FM RF signal
FM ANT
75Ω
AM RF signal
AM ANT
AM LOOP ANT
AM antenna coil
AM antenna trimmer
AM OSC
AM OSC coil
D101,202,203
MA165
IC101
AN7274NS
FM IF & DET/ AM CONV.
IC102
AN278
FM IF AMP
D103,104
MA165
Q101
2SC1675
IF AMP
Q102
2SC3311
IF SELECTOR
Q103,104
2SA1309
IF SELECTOR
Q705,Q706
2SC3311
FM/AM SELECTOR
Q201
2SC3311
AM STOP LEVEL SWITCHING
D201
KV1236Z
AFC
Q904
2SA564
FM/AM LOOP FILTER
Q902,903
2SC945
FM/AM LOOP FILTER
T101
T102
FM det. coil
TP101
TP102
FM off-set voltage 0mV
REC LEVEL signal
IC302
MN4066BS
REC SELECTOR
Rec selector "on" → 4.7V
Rec selector "on" → 0V
FM/AM → "off" REC LEVEL → "on"
FM/AM → "on" REC LEVEL →
D935
MA165
D304
D303
D911
D102
MA165
Signal strengh level adj.
SIGNAL STRENGTH LEVEL ADJ
D301,303,304
MA165
IC901
μPD17I4G513
PLL CONTROLL
Crystal OSC 4.5MHz
Forcible monaural mode
Muting output operate
LCD
D916
D917
D919
D920
D921
D922
D926
D905
(XA) only



■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

※ The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with ✪ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part please use the part No. in the replacement part list.

Note 1:

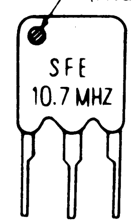
1. **S1 ~ S8** : Preset tuning switch. 1 ~ 16 CH
2. **S11** : Memory switch. (manual ←→ auto).
3. **S12** : Tuning (up) switch. [up : tuning to higher frequency]
4. **S13** : Tuning (down) switch. [down : tuning to lower frequency]
5. **S16** : FM selector switch. (— frequency shift +25 kHz)
6. **S17** : AM selector switch. (— allocation 9 kHz/10 kHz)
7. **S18** : FM mode switch. (auto ←→ mono).
8. **S20** : Scan level switch. (— dB, — level)
9. **S21** : FM signal — strength indicator switch. (off ←→ on)
10. **S701** : Power source switch in "**on**" position.
11. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
    * Voltage with numerical volume only is the voltage with FM mono signal received.
    * Figures in ≪ ≫ stand for DC voltage in muting mode.
    * Figures in ( ) stand for DC voltage in AM signal reception mode.
12. ⇨ FM signal ■■■■▶ AM OSC ▱▱▱⇨ REC level signal
    ➡ AM signal ░░░ AF signal lines
    □□□□⇨ FM OSC ——— Positive voltage lines.
13. Important safety notice:
    Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

Note 2:

● Use of ceramic filters in pairs

The ceramic filters (CF101, CF102) for FM-IF circuit are available in two ranks. For this machine, be sure to use the ceramics of the same rank in a pair.
At repairing and replacement, pay close attention to the diode (D901, D902) for use as different diodes must be used depending on each rank of the ceremic filters.

Color marking (Red or Black)



RANK (Color)	D901	D902	CENTER FREQUENCY
Black	O	X	10.65 MHz
Red	X	X	10.70 MHz

Note: O Mark Diode is used.
X Mark Diode is not used.

■ RESISTORS, CAPACITORS & REPLACEMENT PARTS LIST

Notes:

1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
   The "Ⓢ" mark is service standard parts and may differ from production parts.
   The unit of resistance is OHM (Ω).
   K = 1000Ω, M = 1000kΩ
   The unit of capacitance is MICROFARAD (μF)
   P = 10^{-6} μF
   Ⓚ -marked, parts are used for black only, while ◯-marked parts are for silver type only.
   Part other than Ⓚ -and ◯-marked are used for both black and silver type.
   The parenthesized numbers in the column of description stand for the quantity per set.

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Voltage	Value	Tolerance	Peculiarity
ECEA	50	M	R47	R
Type	Voltage	Peculiarity use	Value.	Special use

Capacitor Type	Voltage		Tolerance
	ECEA Type	Other	
ECEA : Electrolytic ECCD : Ceramic ECKD : Ceramic ECQM : Polyester ECQP : Polypropylene EECW : Liquid electrolyte double layer capacitor	OJ : 6.3V 1A : 10V 1C : 16V 1E : 25V 25 : 25V 1H : 50V 1V : 35V	1H : 50V DC 2R3 : 2.3V DC 1 : 125V DC 2A : 100V 2H : 500V	C : ±0.25pF K : ±10% Z : +80%, −20% J : ±5% G : ±2%

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value

Resistor Type	Wattage	Tolerance
ERD : Carbon ERO : Metal film	25 : 1/4W S2 : 1/4W S1 : 1/2W	J : ±5% F : ±1%

RESISTORS

Ref. No.	Part No.	Value
	ERDS2TJ104	100K
	ERDS2TJ273	27K
	ERDS2TJ101	100
01	ERDS2TJ122	1.2K
02	ERDS2TJ104	100K
03	ERDS2TJ822	8.2K
04	ERDS2TJ222	2.2K
05	ERDS2TJ155	1.5M
06	ERDS2TJ184	180K
07	ERDS2TJ102	1K
08	ERDS2TJ333	33K
09	ERDS2TJ103	10K
10, 111	ERDS2TJ682	6.8K
12	ERDS2TJ104	100K
13	ERDS2TJ473	47K
14	ERDS2TJ101	100
15	ERDS2TJ473	47K
16	ERDS2TJ332	3.3K
17	ERDS2TJ391	390
18	ERDS2TJ221	220
19	ERDS2TJ122	1.2K
21	ERDS2TJ392	3.9K
22, 123	ERDS2TJ331	330

Ref. No.	Part No.	Value
R201	ERDS2TJ104	100K
R202	ERDS2TJ332	3.3K
R203	ERDS2TJ473	47K
R204	ERDS2TJ563	56K
R205	ERDS2TJ104	100K
R206	ERDS2TJ101	100
R207	ERD25TJ104	100K
R208	ERDS2TJ273	27K
R209	ERDS2TJ102	1K
R210	ERDS2TJ473	47K
R211	ERDS2TJ222	2.2K
R212	ERDS2TJ473	47K
R301	ERDS2TJ471	470
R302	ERDS2TJ682	6.8K
R303	ERDS2TJ123	12K
R304, 305	ERDS2TJ684	680K
R308	EROS2TKF1502	15K
R309	ERDS2TJ102	1K
R310, 311	ERDS2TJ274	270K
R312	ERDS2TJ274	270K
R313	ERDS2TJ103	10K
R314	ERDS2TJ100	10
R315	ERDS2TJ393	39K

Ref. No.	Part No.	Value
R316	ERDS2TJ183	18K
R317	ERDS2TJ562	5.6K
R318	ERDS2TJ682	6.8K
R319	ERDS2TJ563	56K
R320	ERDS2TJ104	100K
R321, 322	ERDS2TJ224	220K
R323	ERDS2TJ681	680
R324	ERDS2TJ564	560K
R327	ERDS2TJ822	8.2K
R328	ERDS2TJ472	4.7K
R331, 332	ERDS2TJ153	15K
R501	ERDS2TJ103	10K
R505	ERD25TJ335	3.3M
R701 ⚠	ERD25FJ6R8	6.8
R702 ⚠	ERD25FJ102	1K
R703	ERDS2TJ101	100
R704 ⚠	ERD25FJ561	560
R705	ERDS2TJ101	100
R707	ERDS2TJ473	47K
R710 ⚠	ERDS1FJ102	1K
R711	ERDS2TJ154	150K
R713	ERDS2TJ473	47K
R714	ERDS2TJ103	10K

Ref. No.	Part No.	Value
R715	ERDS2TJ151	150
R720	ERDS2TJ154	150K
R721	ERDS2TJ394	390K
R904	ERDS2TJ681	680
R905	ERDS2TJ472	4.7K
R906	ERDS2TJ182	1.8K
R907	ERDS2TJ102	1K
R908	ERDS2TJ123	12K
R910	ERDS2TJ561	560
R911	ERDS2TJ102	1K
R912	ERDS2TJ822	8.2K
R913	ERDS2TJ123	12K
R914	ERDS2TJ104	100K
R915	ERDS2TJ103	10K
R916	ERDS2TJ682	6.8K
R918	ERDS2TJ102	1K
R919	ERD25FJ182	1.8K
R935	ERDS2TJ682	6.8K

CAPACITORS

Ref. No.	Part No.	Value
	ECEA1EU3R3	3.3
Ⓢ	ECKD1H103ZF	0.01
1 Ⓢ	ECQM1H223JZ	0.022
2	ECEA0JU101	100
3 Ⓢ	ECQM1H102JZ	0.001
4, 105 Ⓢ	ECKD1H103ZF	0.01
6 Ⓢ	ECCD1H040CC	4P
7 Ⓢ	ECCD1H101K	100P
8	ECEA0JU101	100
9	ECEA1HUR22	0.22
0	ECEA1EU4R7	4.7
4, 112 Ⓢ	ECKD1H103ZF	0.01
3, 114 Ⓢ	ECKD1H103ZF	0.01
5 Ⓢ	ECKD1H103ZF	0.01
6	ECQM1H102JZ	0.001
7, 118 Ⓢ	ECKD1H103ZF	0.01
9, 120 Ⓢ	ECKD1H103ZF	0.01
Ⓢ	ECKD1H103ZF	0.01
2 Ⓢ	ECQM1H223JZ	0.022

Ref. No.	Part No.	Value
C202 Ⓢ	ECQM1H473JZ	0.047
C203 Ⓢ	ECCD1H180KC	18P
C204	ECQP1471JZ	470P
C205	ECEA0JU101	100
C206 Ⓢ	ECKD1H103ZF	0.01
C207 Ⓢ	ECCD1H080DC	8P
C208 Ⓢ	ECCD1H680K	68P
C209 Ⓢ	ECKD1H103ZF	0.01
C210	ECEA0JU330	33
C211 Ⓢ	ECKD1H103ZF	0.01
C212	ECEA1HUR47	0.47
C213 Ⓢ	ECKD1H223ZF	0.022
C214 Ⓢ	ECQM1H183JZ	0.018
C215 Ⓢ	ECKD1H103ZF	0.01
C221	ECEA0JU330	33
C301 Ⓢ	ECKD1H103ZF	0.01
C302 Ⓢ	ECKD1H102ZF	0.001
C303 Ⓢ	ECEA1AU101	100
C305, 306 Ⓢ	ECQM1H153JZ	0.015

Ref. No.	Part No.	Value
C307, 308	ECEA1EU3R3	3.3
C309, 310	ECEA1CU100	10
C311	ECQP2A391GZ	390P
C312	ECEA1CU100	10P
C313	ECEA1HUR47	0.47
C314, 315	ECEA1HUR22	0.22
C316	ECEA1CU100	10
C318	ECEA1HU010	1
C319 Ⓢ	ECKD1H103ZF	0.01
C320	ECCD1H471K	470P
C323, 324	ECQM1H272JZ	0.0027
C326 Ⓢ	ECQM1H223JZ	0.022
C502	ECEA1HUR22	0.22
C701	ECEA1CU102	1000
C702	ECEA1CU222	2200
C703	ECEA1VU471	470
C704	ECEA1CU471	470
C705, 706 Ⓢ	ECKD1H103ZF	0.01
C707	ECEA1AU471	470

Ref. No.	Part No.	Value
C708	ECKD2H102ZF	0.001
C709	ECEA0JU330	33
C710	ECEA1CU100	10
C901 Ⓢ	ECKD1H103ZF	0.01
C902, 903	EECW2R3A3R3E	3.3
C904	ECEA0JU102	1000
C905 Ⓢ	ECCD1H070DC	7P
C906 Ⓢ	ECCD1H180KC	18P
C907 Ⓢ	ECKD1H103ZF	0.01
C908 Ⓢ	ECQM1H223JZ	0.022
C909 Ⓢ	ECKD1H103ZF	0.01
C910	ECEA25M4R7R	4.7
C911, 912 Ⓢ	ECKD1H103ZF	0.01
C921 Ⓢ	ECCD1H680K	68P
C922 Ⓢ	ECCD1H390K	39P
C955	ECEA1HUR47	0.47

Ref. No.	Part No.	Description
INTEGRATED CIRCUITS		
IC101	AN7274NS	Integrated Circuit
IC102	AN278	Integrated Circuit
IC301	AN7472S−A	Integrated Circuit
IC302	MN4066BS	Integrated Circuit
IC901	μPD1714G513	Integrated Circuit
TRANSISTORS		
Q101	2SC1675L1	Transistor
Q102, 201, 705, 706, 711~713	2SC3311Q	Transistor
Q103, 104	2SA1309Q	Transistor
Q701, 702	2SC1685−QNC	Transistor
Q902, 903	2SC945P1	Transistor
Q904	2SA722−S	Transistor (Product Part No. is 2SA564)
DIODES		
D101~104, 202, 203, 301~304, 711, 721, 906~917, 919~922, 926, 905, [XA] only	MA165	Diode
D201 ⚠	SVDKV1236Z	Rectifire
D305	MA4082M	Diode
D701, 702 ⚠	SVDSR1K2	Rectifire
D703	MA4150M	Diode
D704	MA4062M	Diode
D713	LN846RP	LED
D714	LN446YP	LED
D901, 902	MA150	Diode
D935	MA165	Diode
COILS		
L202	SLA2B1−P	Coil
L203	SL02B7−M	Coil
L204, 205	SLQZ12G1−D	Choke
L301, 302	SLM5B2−1P	Coil
L303	SLM1B1−P	Coil
L701	SLQZ650MH49	Choke
L901	RLQY25S5−0	Choke
TRANSFORMERS		
T101	SLI4B520−Z	Transformer
T102	SLI4B521−Z	Transformer
T201	SLI2B104−M	Transformer
T701 ⚠	SLT5K171	Power Source
CERAMIC FILTERS		
CF101, 103, 104	SVFE107MZ2−A	FM, 10.7MHz (Red)
	SVFE107MZ2−D	FM, 10.65MHz (Black)
CF102	SVFE107MX2−A	FM, 10.7MHz (Red)
	SVFE107MX2−D	FM, 10.65MHz (Black)
CF201	SVFSFZ450F7L	AM, 450kHz

Ref. No.	Part No.	Description
CRYSTAL		
X901	SVQ49U452−T	Crystal
VARIABLE RESISTORS		
VR101, 301	EVN58AA00B15	100kΩ (B)
VARIABLE CAPACITOR		
CT201	SVCTZ03T110F	Trimmer
THERMISTER		
TH101	ERTD2ZHL332S	Thermister
LAMP		
PL1 ⚠	XAMS15S150	Lamp
FUSE		
F1 ⚠	XBA2C05TR0	250V, T500mA
SWITCHIES		
S1~8, 11~13, 15~21	SSG13	Pre-set
S701 ⚠	SSH1069	Power Source
LIQUID CRYSTAL DISPLAY		
LCD	SALHLC9151	Liquid Crystal Display
FRONT END PACK		
	SNVFE407G29	Front End Pack

Ref. No.		Part No.	Description	
CABINET and CHASSIS PARTS				
1	◯	SGU446−3	Transparent Plate	(1)
1	Ⓚ	SGU446−2	Transparent Plate	(1)
2	◯	SGWTG4−SE	Front Panel Ass'y	(1)
2	Ⓚ	SGWTG4−KE	Front Panel Ass'y	(1)
3	◯	SBC691−1	Button	(1)
3	Ⓚ	SBC691	Button	(1)
4	◯	SBC690−3	Button	(1)
4	Ⓚ	SBC690−2	Button	(1)
5	◯	SGX7733−1	Ornament Plate	(1)
5	Ⓚ	SGX7733	Ornament Plate	(1)
6	◯	SBC705−1A	Button	(1)
6	Ⓚ	SBC705A	Button	(1)
7	◯	SGXTG4−SE	Grille Ass'y	(1)
7	Ⓚ	SGXTG4−KE	Grille Ass'y	(1)
7-1	◯	SKD6195−1	Index Plate	(1)
7-1	Ⓚ	SKD6196	Index Plate	(1)
8		SHR5297	Spacer	(1)

Ref. No.		Part No.	Description	
CABINET and CHASSIS PARTS				
9	◯	SBC692−1A	Button	(1)
9	Ⓚ	SBC692A	Button	(1)
10		SUW2918	Bracket	(1)
11		SBC666	Button	(1)
12		SUB201	Connection Rod	(1)
13		SMP381	Lamp Cover	(1)
14		SUW2904	Bracket	(1)
15		SJS9230	AC Inlet	(1)
16		SHE181	PCB Holder	(4)
17		SHR9748	PCB Holder	(1)
18		SJF8613−2N	Terminal Board	(1)
19		SGPTG4−SG	Chassis Ass'y (W/Feet)	(1)
19-1		SKL293	Foot	(4)
20	◯	SKCTG4−SE	Cabinet	(1)
20	Ⓚ	SKCTG4−KE	Cabinet	(1)
21		SHR9736	Holder	(1)
22		SDU267	Filter	(1)
23		SJT231	Terminal	(2)
24		SUS803	Spring	(1)
25		SJE105	Connector	(1)
26		SJT347	Fuse Terminal	(2)
27		SJS5327	Socket (3P)	(1)
27		SJS5421	Socket (4P)	(1)
27		SJS5519	Socket (5P)	(1)
27		SJS5707	Socket (7P)	(1)
27		SJS5903	Socket (9P)	(1)
SCREWS				
N1	Ⓢ	XTB3+8BFZ	Tapping, ⊕3×8	(5)
N2	Ⓢ	XTB3+8BFZ	Tapping, ⊕3×8	(17)
N3		XYNS3+C6−1S	Screw, ⊕3×6	(3)
N4	Ⓢ	XTB3+20BFN	Tapping, ⊕3×20	(4)
N5		XTW3+8BFR	Tapping, ⊕3×8	(2)
N6	Ⓢ	XTB3+8BFZ	Tapping, ⊕3×8	(4)
N7	◯	SNE2095−4	Cabinet	(4)
N7	Ⓚ	SNE2095−5	Cabinet	(4)
PACKING PARTS				
P1	◯	SPG5280	Carton Box	(1)
P1	Ⓚ	SPG5278	Carton Box	(1)
P2		SPS4550	Pad (Front)	(1)
P3		SPS4551−2	Pad (Rear)	(1)
P4		SPS4563	Pad (Spacer)	(2)
P5		SPS4552	Pad (Accessory)	(1)
P6		SPP697	Polyethylene Sheet	(1)
ACCESSORIES				
A1		SQF12414	Instruction Book	(1)
A2	Ⓚ	SGK1411	Label (Black)	(1)
A3		SJP2249	Connection Cord	(1)
A4		SSA270	FM Antenna	(1)
A5		SSA902−4	AM Loop Antenna	(1)
A6		SMA231	Holder B (for Set)	(1)
A7		SMA233−1	Holder A (for Rack)	(1)
A8		XTN3+10AFZ	Tapping, ⊕3×10	(2)
A9	⚠	SFDAC05E02	AC Cord	(1)

■ EXPLODED VI

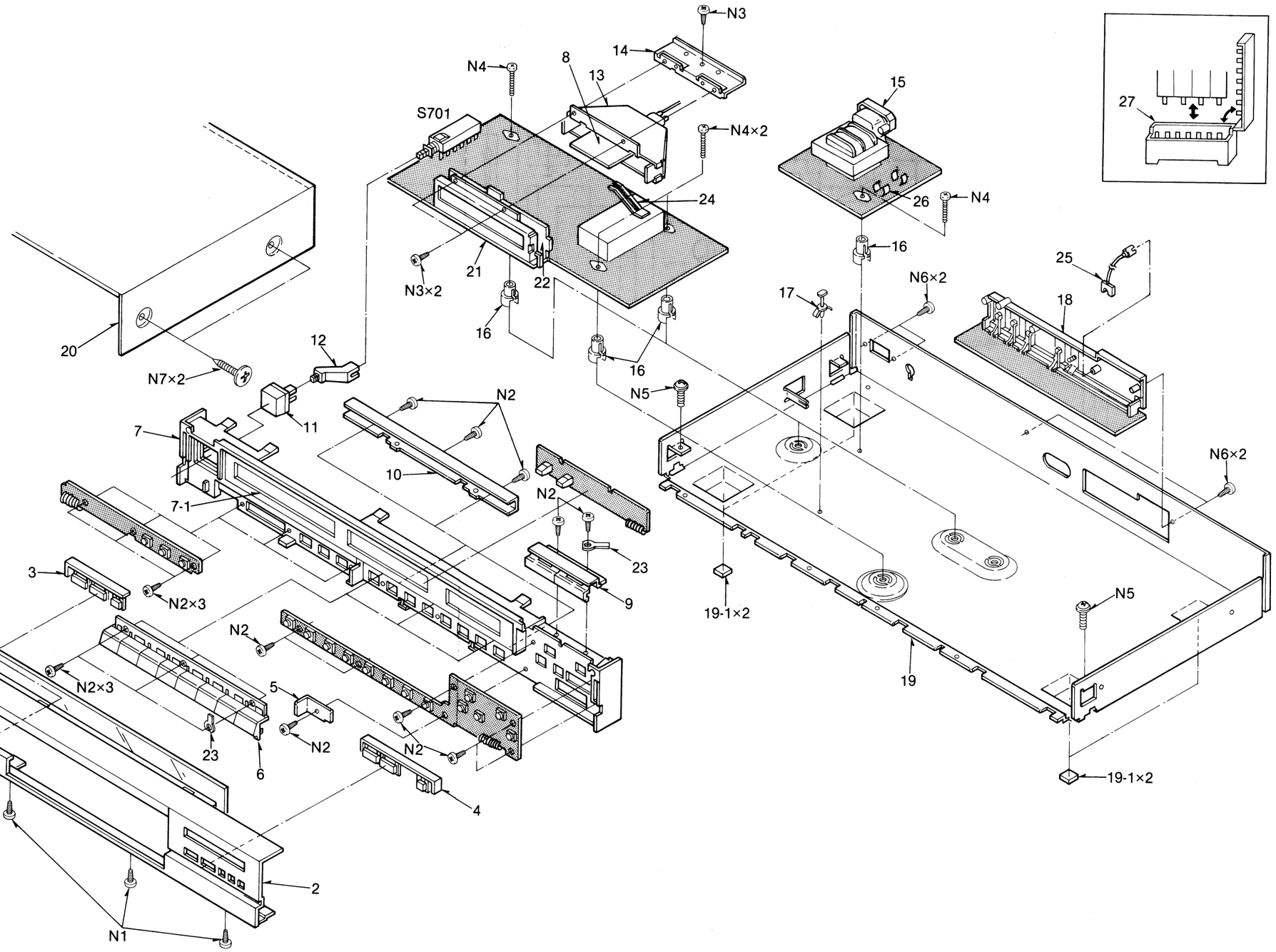
A

B

C

A	
B	
C	

■ EXPLODED VIEW



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